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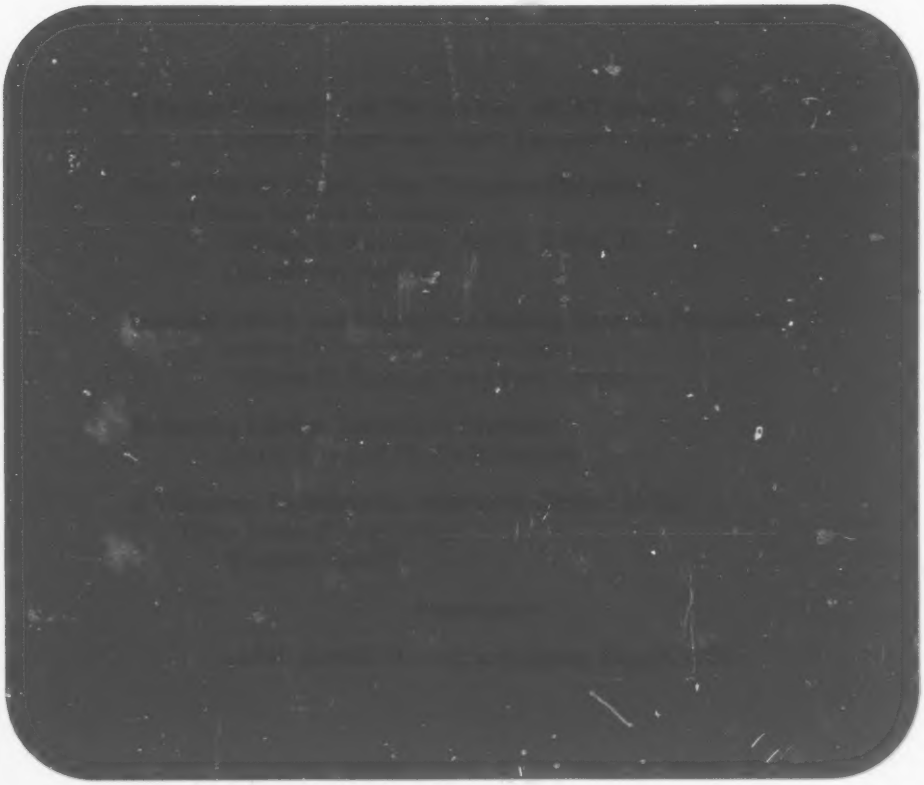

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A Factor Comparison of Old and New MCAT Scales

Robert F. Jones, Ph.D., and Maria Thomae-Forgues

Abstract—The old Medical College Admission Test (MCAT) and the New MCAT were compared by factor-analyzing the scores of a sample of 1,484 examinees who had taken both test batteries during 1976–77. Three common factors were extracted and interpreted. The first, a general science-quantitative factor, linked scales from both test batteries. A second factor, labeled verbal ability, characterized primarily two scales from the old test, Verbal Ability and General Information. A third factor, interpretation skills, was common to the two skills analysis scales of the new test. Specific variance for each subtest was also estimated by comparing the variance accounted for by these factors with the systematic variance indicated by the reliability. It appears that the old Quantitative Ability subtest measured unique skills which have not been incorporated into the new battery. Also the new Biology and Physics scores seem to provide specific information on knowledge in a particular discipline in addition to general science knowledge. Discussion centers on the implications of these data for the use of New MCAT scores in admissions.

Now that institutions are gaining experience with the New Medical College Admission Test (New MCAT), comparisons with the old test are inevitable. Of interest, of course, is whether the New MCAT will prove to be a stronger and more consistent predictor of medical school performance than the old examination. Other, direct comparisons between the two test batteries are informative, and two such studies have now been reported. The first is a correlation study by Givner and Hynes (1), and the second a factor analytic study by J. B. Molidor and A. S. Elstein reported at the Eighteenth Annual Conference on Research in Medical Education (RIME) of the Association of American Medical Colleges in 1979.

Dr. Jones is a research associate and Ms. Thomae-Forgues a research assistant in the Division of Educational Measurement and Research of the Association of American Medical Colleges, Washington, D.C.

Givner and Hynes examined the correlations between old and New MCAT scores for 66 repeat applicants to the University of Nebraska School of Medicine. These correlations generally were not very high. Particularly striking was the finding that the old Verbal Ability subtest correlated only .25 with the new Skills Analysis: Reading scale; likewise, the respective quantitative sections correlated only .37. The old Science Achievement subtest did show a relationship of .70 with the new science areas of assessment; but as the authors correctly noted, this demonstrates only about 50 percent of shared variance. They concluded on a preliminary basis that the New MCAT was assessing skills not measured by the old test. However, the size and representativeness of their sample may limit the generalizability of their findings.

Molidor and Elstein took a different approach. They conducted principal com-

ponents analyses on the old and new test batteries separately, using consecutive-year applicant pools to the Michigan State University College of Human Medicine. Results were informally compared. Both batteries yielded a two-factor structure; as the authors observed, this structure was more clearly defined for the old test than the new. The old MCAT was reduced to a verbal and a science-quantitative factor. The new scales clustered on a science dimension and a skills analysis dimension.

A factor analysis or principal components analysis used in this context, that is, in analyzing a small battery of achievement tests, should be interpreted with caution. The extraction of only one or two common factors is predictable, as is the finding that the first factor extracted accounts for a very large proportion of the variance. There is probably a general achievement factor that is present in many positively correlated achievement test batteries. It may be premature to conclude that all the meaningful information from these tests is summarized in the resulting common factors.

Classical theories of factor analysis subdivide the variance for any one test into three types: common, specific or unique, and error. "Common" refers to the proportion of variance a test shares with others in a battery, the degree to which it measures the same things as the other tests. "Specific variance" relates to skills and achievement each test measures uniquely. "Error variance" refers to the degree to which test scores fluctuate in an unsystematic fashion simply due to errors in the measuring process. Both the common and specific components of test scores provide meaningful information. The proportion of variance they account for together is estimated by the reliability of the test.

The suggestion that the New MCAT scales have significant unique components is supported by preliminary evidence of discriminant validity for the science areas of assessment reported by B. C. Deighton and co-workers at the 18th RIME conference. In addition, in the Michigan State study the variance accounted for by the common factors was significantly less than that which can be considered systematic (that is, not due to measurement error), only 56 percent in the case of Skills Analysis:Reading. It would seem useful and necessary to examine unique factors as well as common factors in any formal comparison of the old and new batteries.

The present study was devised with this point in mind. The aim was to include both test batteries simultaneously in a factor analysis so as to gauge the extent to which the variance for any one subtest is shared by any other in the old or new battery or is unique to that subtest. By including old and new scales in the same analysis, the comparisons among scales would be direct rather than inferred or speculative. Also by studying a single group of individuals who had taken both batteries, the authors attempted to confirm the preliminary results from the Nebraska correlational study with a much larger sample.

Method

A total of 2,969 examinees from the national pool who sat for both the last administration of the old MCAT in the fall of 1976 and the first administration of the New MCAT in the spring of 1977 were identified. This represents approximately a 67 percent increase in the size of the typical fall-spring repeater group, due to the special circumstances of instituting a new test battery. This particular population of test repeaters was chosen for study so that the time between test administrations was both standard and minimal.

Four well-known scales comprise the old MCAT: Verbal Ability (VA), Quantitative Ability (QA), General Information

(GI), and Science Achievement (SCI). Six scores are reported for the new test: Science Knowledge covering biology (BIO), chemistry (CHEM), and physics (PHY); Science Problems (SP); Skills Analysis: Reading (SA:R); and Skills Analysis: Quantitative (SA:Q). The Science Problems score is produced from problem-solving items used in computing the three science discipline scores (approximately one-third in each case) and, therefore, bears a spurious relationship to them. This score was not included in the factor analysis described below.

Correlation coefficients among the 10 scores for a random half-sample of the repeater population (n = 1,484) were first examined. This matrix, minus the Science Problems measure, was then factor analyzed using a principal axis solution. Values of R^2 were used to estimate the communalities. The initital solution was rotated according to a Varimax criterion (2). An oblique rotation was then performed by hand using procedures described by Thurstone (3). This process was repeated for the other half-sample. Results were nearly identical, and only the first set of analyses is presented here.

Results

Table 1 presents means, standard deviations, and intercorrelations for all 10 scales. The relationships between old and new scales tend generally to be stronger than those reported in the Nebraska study. One explanation for this may be differences in the range of scores; Nebraska's repeat applicant sample is likely to be more restricted than the group studied here. The strong relationships between the old Science subtest and the new science areas of assessment are as expected and replicate the Nebraska results. The new skills analysis scores, while showing moderate to strong relationships with the old Verbal and Quantitative Ability sections, are more substantially correlated with each other than their counterparts were in the old test. Further insight into these relationships was sought in the factor analysis.

Several orthogonally rotated solutions ranging from two to six factors were first examined. Three factors appeared to exhaust the common variance. This was confirmed later on a second half-sample. After inspecting plots of these factors, they were rotated by hand to a final oblique solution. The oblique factor loadings and estimates of common variance for each scale are included in Table 2. The first factor accounts for 60.9 percent of the variance and reflects obviously the strong science-quantitative component that underlies many of these scales. The second factor, accounting for an additional 11.7 percent of the variance, seems to tap a verbal ability dimension common to both the old Verbal Ability and General Information scales. A third dimension, explaining an additional 6.2 percent of variance, appears to be shared by the two new skills analysis scores and might be labeled "interpretation skills."

These three dimensions, similar to those found in the Michigan State study, together with their associated loadings listed in Table 2, illustrate clearly some of the differences between the old and new test batteries. Both batteries assess science achievement and quantitative skills. No area of assessment in the New MCAT seems to focus specifically on assessing verbal skills and general knowledge, except in a modest way the Skills Analysis: Reading subtest. However, the correlation of .66 found between the science-quantitative factor and the verbal ability factor is fairly high.

The New MCAT introduces assessment in the area of gathering, evaluating, and using information. These skills were not measured by any one subtest in the old MCAT, even by the Verbal Ability scale.

TABLE 1

Means, Standard Deviations, and Intercorrelations Among Old and New Medical College Admission Test Scales*

MCAT Scale†	Mean	S.D.	Intercorrelations								
			VA	QA	GI	SCI	BIO	CHEM	PHY	SP	SA:R
VA	500	96									
QA	558	96	.43								
GI	501	80	.75	.39							
SCI	538	98	.53	.66	.50						
BIO	7.6	2.32	.48	.51	.44	.71					
CHEM	7.3	2.43	.46	.61	.39	.75	.66				
PHY	7.4	2.32	.42	.59	.38	.68	.57	.68			
SP	7.5	2.38	.47	.63	.43	.76	.79‡	.82‡	.78‡		
SA:R	7.5	2.49	.59	.46	.53	.54	.57	.52	.48	.58	
SA:Q	7.5	2.62	.49	.59	.43	.66	.53	.66	.66	.71	.65

* Data are based on a 50 percent random sample of examinees who took the old MCAT in the fall of 1976 and the New MCAT in the spring of 1977 (n = 1,484).

† See text for explanation of abbreviations.

‡ These correlations are spuriously high due to item overlap in scoring (approximately one-third in each case).

TABLE 2

Rotated Factor Loadings for Old and New MCAT Scales-Oblique Solution

MCAT Scale	Factors*			Estimate of Common Variance	Reliability (KR20)	Estimate of Specific Variance
	I	II	III			
Old MCAT						
VA	.02	.64	.03	.77	.91	.14
QA	.54	.01	.02	.53	.90	.37
GI	−.01	.66	.06	.73	.79	.06
SCI	.68	.01	−.08	.82	.89	.07
New MCAT						
BIO	.51	.04	.14	.59	.82	.23
CHEM	.69	−.09	.03	.72	.86	.14
PHY	.63	−.09	.08	.63	.83	.20
SA:R	.22	.27	.42	.67	.76	.09
SA:Q	.52	−.01	.37	.75	.82	.07

* Percent variance accounted for by Factor I = 60.9; Factor II = 11.7; Factor III = 6.2.

Moreover, this third dimension is only weakly correlated with either the science-quantitative (.25) or verbal ability (.22) factors. Both skills analysis scores in the new test are complex variables, each loading highly on more than one factor.

As stated previously, comparisons between the old and new test need not be limited to an examination of common factors. The estimate of common variance explained by these factors is contrasted in Table 2 with an estimate of the reliability for each scale. To reiterate a point made earlier, the latter indicates the proportion of variance that is explainable, that is, not due to measurement error. The difference between these two figures is shown in the final column of Table 2 as an estimate of the proportion of specific variance.

It is evident from these figures that, even though the new test assesses quantitative skills, the old Quantitative Ability scale measured some unique skills that have not been incorporated into the new battery, most likely computational skills or specific knowledge of algebra and geometry. The science scores in the new battery, particularly Biology and Physics, include a unique component that accounts for up to one-fourth of the systematic or explainable variance. In contrast, performance on the skills analysis subtests can be explained for the most part by the three common factors which have been discussed: science-quantitative, verbal ability, and interpretation skills.

Discussion

The finding that the major link between the old and New MCAT lies in a general science-quantitative factor is not surprising. Development of the new test followed recommendations of an Association of American Medical Colleges national task force reporting in 1973 to the Medical College Admissions Assessment Program for more detailed assessment of science achievement and a revision of reading and quantitative ability sections to include more scientific and medicine-related topics. Of particular concern to that task force were the old Verbal Ability and General Information subtests, which, while perhaps less used by admission committees generally, were viewed as having the greatest potential for bias against ethnic and racial minorities. This objection seems to have been met in that none of the new scales, including the new assessment of reading skills, loads particularly high on the common dimension possessed by those old scales.

In this regard, the New MCAT may be considered to provide a more focused assessment than the old test. The change may be accompanied by an increase in predictive utility. The heavy emphasis placed in development on the content relevance of test items suggests that the test will be a strong predictor of medical school performance in the basic medical sciences. In addition, the new assessment of thinking and interpretation skills is expected to establish the test's value as a predictor of clinical performance. A determination of any increased utility for the new test can be made only when a broad range of local validity studies have been conducted. However, the preliminary evidence in regard to predicting basic science performance has been encouraging (4–7).

A constant issue facing admission committees is how best to use New MCAT information in their selection process. While there are common threads between the knowledge and skills measured by the old MCAT and those of the new test (for example, the general science-quantitative factor), one cannot simply attribute the characteristics of the old test to these new scales, particularly with respect to the new reading and quantitative sections. Similarity in nomenclature can be misleading; data here confirm that these tests measure quite different skills than did the old Verbal Ability and Quantitative Ability scales.

Molidor and Elstein offer useful suggestions in this regard. They warn against a simple averaging of the six scores, since this implies a disproportionate weighting of science knowledge and problems which may not be desirable. The reporting of six scores was designed to give schools greater flexibility in their use of test data for admissions and to develop a profile of the strengths and weaknesses of individuals. It was not proposed as an admissions scheme. Though empirical support for this detailed reporting of scores has been given (4) and data here confirm that unique information is provided by each score, future studies must continue to address the usefulness of this score-reporting system.

Averaging the four science scores, as Molidor and Elstein suggest, can produce a quick index of science achievement for gross screening purposes. Note that science problem-solving items are weighted dou-

ble in this method because of the unique scoring system. This can be avoided by averaging only the three discipline scores. Alternatively, the discipline scores might be weighted differentially in accordance with local emphases in the medical school curriculum.

Factor analysis itself cannot provide a single, definitive answer to the question of how New MCAT information can be used most effectively in admissions. This is a matter of empirical verification at the local level and depends greatly on the values placed on various educational outcomes at each particular school. Once a school has constructed reliable measures of criteria that reflect these values, appropriate weights could be developed for a variety of admissions data. Actuarial models for combining information, that is, computer-generated equations based on regression analyses, have been shown to be remarkably effective (8), although there is some resistance to their use. New MCAT data certainly will be useful when academic performance in medical school is being considered. By conducting local analyses, schools can find the best way to put the test score data in the service of their particular educational goals.

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DATAGRAM

Results of the NRMP for 1981

The number of U.S. graduates (USG) who enrolled in the National Resident Matching Program (NRMP) in 1981 was 524 more than in 1980 (1); 96 percent of the graduates enrolled in the matching program. The number who subsequently withdrew increased by one percentage point, and the proportion who were unmatched remained at 7 percent (Table 1). Among the North American graduates (NAG), the number of "fifth pathway" applicants decreased from 506 to 456; 350 participated in the match, and 83 percent were successful, compared with 92 percent of the Canadian graduates, 65 percent of the osteopathic graduates, and 61 percent of physician applicants. The number of graduates of foreign medical schools (FMG) who applied increased by 663. Of the 2,516 who applied, 785 were U.S. citizens. The percentage of FMG who matched decreased.

The number of positions offered in the match increased by 276; 168 more were offered in the generalist* specialties than in 1980 (Table 2). The overall filling of positions increased by 2 percentage points; USG filled 69 percent of the positions offered. Again in 1981 obstetrics and orthopedic surgery have the highest percentages of filled positions.

Seventy-seven percent of the programs that offered 88 percent of the positions in the match in 1981 attracted U.S. graduates, who filled 79 percent of the positions. Another 6 percent of the positions in these programs were filled by other applicants, and thus 85 percent of the positions in these programs were filled. The other 23 percent of the participating programs offered 12 percent of the positions in the match but did not attract any U.S. graduates. Only 20 percent of the positions were filled in these programs by other applicants.

Only 24 more USG entered family practice programs than in 1980, and the filling of available positions decreased by 1 percent. Internal medicine attracted 109 fewer USG than last year, and the percentage filling of positions decreased by 3 percentage points because of the increase in positions offered.

In pediatrics, obstetrics-gynecology, general surgery, neurosurgery, otolaryngology, anesthesiology, pathology, diagnostic and therapeu-

TABLE 1

Participation in the National Resident Matching Program in 1981

Category	U.S. Students		North American Graduates*		Foreign Graduates		Total	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Applicants	15,496	100	1,143	100	2,516	100	19,155	100
Withdrew	1,791	12	407	36	853	34	3,051	16
Active Participants	13,705	88	736	64	1,663	66	16,104	84
Matched	12,724	93	548	74	872	52	14,144	88
Unmatched	981	7	188	26	791	48	1,960	12
Total	13,705	100	736	100	1,663	100	16,104	100

* North American graduates include graduating students from U.S. osteopathic schools; Canadian medical schools; physician candidates, that is, U.S. graduates who did not enter GME directly from medical school; and "fifth pathway" students, who are U.S. nationals who have completed course requirements for a medical degree abroad followed by a year of clinical training in a U.S. hospital under medical school sponsorship.

* "Generalist" specialties are defined as family practice, internal medicine, obstetrics, and pediatrics.

tic radiology, and flexible programs, both the numbers of positions and USG entering them were greater in 1981 than in 1980. In psychiatry, orthopedic surgery, and urology, the numbers of positions offered were decreased and the numbers of USG entering them increased with the result that the filling of these types of programs increased.

The distribution of matched USG among the various specialties decreased by 2 percentage points in internal medicine and increased by one in pediatrics and in the support specialties. The percentages of FMG who matched into programs in family practice, internal medicine, and general surgery increased, and decreases occurred in the percentages matched into the support specialties and flexible residencies.

This year there were an additional 57 positions in the medical, surgical, and support specialties that were offered as second-year positions in a sequence with categorical first-year positions in internal medicine or general surgery; 84 percent of them were filled, including all offered as medicine-neurology, ophthalmology, and radiology and 10 of 13 offered as medicine-psychiatry. The 17 positions offered as surgery-orthopedic surgery also were filled in the match.

Of the 981 unmatched U.S. graduates, the first choices of 13 percent were for programs in medicine, of 15 percent for obstetrics, of 20 percent for general surgery, of 15 percent for family practice, and of 4 percent for pediatrics; thus a total of 47 percent of unmatched students made a first choice in one of the generalist specialties, which is 6 percent less than in 1980.

Data that describe the trends in numbers of positions offered and filled by U.S. graduates and other applicants during the past several years were included in the 1981 *NRMP Directory* (2).

JOHN S. GRAETTINGER, M.D., *executive vice president, National Resident Matching Program; associate dean for graduate medical education, Rush-Presbyterian-St. Luke's Medical Center; and professor of medicine, Rush Medical College, Chicago*

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TABLE 2

Positions Offered and Filled by Specialty and Type of Applicants in the NRMP in 1981

Specialties	Positions Offered		Applicants Matched											
			U.S. Students			North American Graduates‡			Foreign Graduates			Total		
	No.	Percent*	No.	Percent		No.	Percent		No.	Percent		No.	Percent	
				*	†		*	†		*	†		*	†
Family Practice	2,370	13	1,727	14	72	60	11	3	71	8	3	1,858	13	78
Internal Medicine	6,129	33	4,327	34	70	191	35	3	381	44	6	4,899	35	79
Pediatrics	1,833	10	1,241	10	67	55	10	3	103	12	6	1,399	10	76
Obstetrics	1,008	6	810	6	80	56	10	6	54	6	5	920	6	91
Medical Specialties	1,032	6	533	4	52	18	3	2	17	2	2	568	4	55
Dermatology	(8)		(6)		(75)	(0)		—	(0)		—	(6)		(75)
Neurology	(74)		(24)		(32)	(0)		—	(2)		(3)	(26)		(35)
Ophthalmology	(27)		(14)		(51)	(0)		—	(0)		—	(14)		(51)
Psychiatry	(923)		(489)		(52)	(18)		(2)	(15)		(2)	(522)		(56)
Surgery	2,407	13	1,769	14	73	100	18	4	143	16	6	2,012	14	83
Surgical Subspecialties	431	2	356	3	83	15	3	3	8	1	1	389	3	88
Neurosurgery	(45)		(34)		(75)	(2)		(4)	(3)		(7)	(39)		(86)
Orthopedics	(250)		(237)		(94)	(7)		(3)	(0)		—	(244)		(97)
Otolaryngology	(52)		(39)		(75)	(1)		(2)	(1)		(2)	(41)		(78)
Urology	(84)		(46)		(54)	(5)		(6)	(4)		(5)	(55)		(65)
Support Specialties	1,672	9	878	7	53	22	4	1	60	7	3	960	7	57
Anesthesiology	(526)		(291)		(55)	(6)		(1)	(26)		(5)	(323)		(61)
Pathology	(574)		(244)		(42)	(7)		(1)	(11)		(2)	(262)		(45)
Physical Medicine	(105)		(37)		(35)	(0)		—	(12)		(11)	(49)		(46)
Diagnostic Radiology	(383)		(291)		(75)	(9)		(2)	(5)		(2)	(305)		(79)
Therapeutic Radiology	(84)		(15)		(17)	(0)		—	(6)		(7)	(21)		(25)
Flexible	1,449	8	1,083	8	74	31	6	2	35	4	2	1,149	8	79
Total	18,331	100	12,724	100	69	548	100	3	872	100	5	14,144	100	77

* Percent distributions of positions offered and filled among specialties.

† Percent filling of positions.

‡ See footnote Table 1.

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Publication of the Association of American Medical Colleges

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COMMUNICATIONS

Geographic Region, Size, and Program Type In Family Practice Residencies

Jolene K. Berg, M.D., and Judith Garrard, Ph.D.

Research focusing on residency education in family practice has grown steadily since the 1960s when residency programs in this specialty were first established. In the course of one such study (1), the present authors examined three programmatic variables: geographic region, size, and type of program. This paper provides definitions of these variables, describes the current distribution of family practice residency programs across each of these variables, and presents the raw data for use by other researchers.

Methods

In 1979 a questionnaire about psychosocial support in residency training programs was mailed to program directors of all family practice residency programs (N = 362) listed in the *Guide to Family Practice Residency Programs* (2). In addition to the primary research data, information about geographic region, size, and type of program was obtained. Complete data were available for 359 programs (99 percent). The data were examined by means of chi-square for statistical differences within and between these three variables.

Results

Four geographic regions, northeast, south, midwest, and west, as defined in the *NIRMP Directory* (3), were used for this study.* The highest frequency of family practice residencies was located in the midwest (33 percent), followed by the south (28 percent), northeast (21 percent), and west (18 percent).

Residency programs were divided into three categories by size, defined as number of first-year residency positions available: small (two to four first-year positions), medium (five to eight positions), and large (nine or more positions). The authors determined size categories based on the frequency distribution of all residency programs. Thus, 29 percent of family practice residencies were small programs, 52 percent medium, and 19 percent large. The program sizes which occurred most frequently included programs with six (n = 108), four (n = 95), eight (n = 46), or 12 (n = 28) first-year residency positions. It was assumed that number of positions available accurately reflected size of program since most first-year residency positions in family practice were filled (4).

The third program variable, type of program, used definitions of program structure set forth by the American Academy of Family Physicians (5). The five program types, together with the percentage of residency programs in each, are described as follows. There are three types of community based programs: those based in a community hospital without university affiliation (14 percent), those based in and administered by a community hospital but having a formal affiliation with a university or medical school (50 percent), and those based in a community hospital but administered by a university or medical school (15 percent). The other two types of residency programs are those based at and administered by a university or

This study was supported in part by National Institute of Mental Health grant MH-05921-28 for psychiatry undergraduate training and in part by the Department of Family Practice and the Department of Psychiatry, University of Minnesota.

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* A complete list of states included within each geographic region can be obtained from the senior author.

medical school (16 percent) and those administered by the military (5 percent).

The three program variables do not function independently. As shown in Table 1, residency programs were not evenly distributed throughout the four geographic regions ($p < .05$). Most of the small (35 percent) and medium (35 percent) programs were found in the midwest, whereas most of the large programs were in the south (41 percent).

Size of program and type of program also showed a significant difference in the distribution of programs ($p < .0001$). Sixty-one percent of small programs and 50 percent of medium programs were community based-university affiliated. The majority of large programs were either university based (34 percent) or community based-university affiliated (34 percent).

Finally, type of program and geographic region also showed a distribution that is statistically significant ($p < .0001$). In this case, the largest percentage of programs in the northeast (56 percent), midwest (63 percent), and west (48 percent) are community based-university affiliated. The programs in the south are more evenly distributed among three types: community based-university affiliated (32 percent), university based (26 percent), and community based-university administered (24 percent).

Residency programs can be characterized not only according to the three individual programmatic variables described initially or by paired combinations of the variables as above but also by many other combinations. For the convenience of the reader who wants to pursue other questions related to geographic region, size, and program type, the data in Table 1 are given by numbers of programs in each cell rather than by percentages.

Discussion

While the three program variables described in this paper do not explain all of the variation among family practice residency programs, these variables are objective, easily measured, and representative of some basic program differences. The numbers reported in Table 1 are expected to change as new programs are developed and others are revised; however, it is expected that the usefulness of these three program variables will not diminish.

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A Model for Medical Care in Underserved Areas

Maurice A. Mufson, M.D., and Donald E. Melnick, M.D.

West Virginia stands out as medically underserved (1). Marshall University School of Medicine, a new community-based medical school in Huntington, West Virginia, aims to improve the number and distribution of physicians in West Virginia through active involvement of its faculty and residents in primary care delivery. To meet these goals, the faculty of the Department of Medicine established an outreach program with National Health Service Corps (NHSC) internists practicing in rural clinics by organizing inpatient services of patients from the combined practices of the department and the NHSC at centrally located community hospitals. The organization of the inpatient service under this outreach program may serve as a model for the establishment of similar programs at other medical schools located within reach of NHSC sites.

Organization

The Marshall University School of Medicine utilizes two community hospitals in Huntington for its teaching and clinical programs. For the purposes of engaging in the private practice of medicine, the 18 full-time members of the Department of Medicine are organized as a practice group and have medical staff appointments at both community hospitals. The faculty medical group provides primary and specialty internal medicine care for patients admitted to these hospitals from its practice, referred by other physicians, or admitted from the emergency rooms of the hospitals.

Six NHSC physicians, who are board certified or qualified internists, staff five primary care clinics located between eight and 35 miles from Huntington. Prior to the initiation of the outreach program, they admitted patients from their individual practices to the hospital and separately provided all daily medical care. Because their clinics are remote and reachable only by secondary roads and because physicians have disparate clinic schedules, the NHSC physicians could not make rounds comprehensively for each other. This necessitated their driving to the hospitals usually more than once a day to provide medical care to their inpatients and to unassigned patients admitted from the hospital emergency rooms. To care for a relatively few inpatients, they frequently had to interrupt full clinic schedules. Also they were often on night call.

The outreach inpatient service now includes the combined inpatient services of the department and NHSC faculties. The teaching team on the outreach inpatient service consists of an attending physician, either a department faculty member or a NHSC physician, junior and

Dr. Mufson is professor and chairman, Department of Medicine, Marshall University School of Medicine, Huntington, West Virginia, and Dr. Melnick is an assistant professor and section chief of general internal medicine in that department.

TABLE 1

Number of Residency Programs (n = 359) in 1979 Distributed by Geographic Region, Size, and Type of Program*

Type of Program	Northeast (n = 76)			South (n = 101)			Midwest (n = 119)			West (n = 63)		
	Small	Medium	Large	Small	Medium	Large	Small	Medium	Large	Small	Medium	Large
Community based (n = 51)	7	10	1	3	6	1	3	7	0	6	5	2
Community based—university affiliated (n = 179)	18	21	4	9	17	6	22	42	10	14	12	4
Community based—university administered (n = 54)	0	1	3	5	13	6	8	10	3	0	5	0
University based (n = 59)	4	3	3	2	11	13	3	4	6	0	8	2
Military (n = 16)	0	0	1	0	6	3	0	1	0	0	3	2

* Statistical comparisons of these three program variables show the following paired differences: geographic region by program size: chi-square = 12.75, df = 6, $p < .05$; program size by type of program: chi-square = 37.09, df = 8, $p < .0001$; type of program by geographic region: chi-square = 55.97, df = 12, $p < .0001$.